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Measurement of two-particle pseudorapidity correlations in proton-lead and lead-lead collisions with the ATLAS detector

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Two-particle pseudorapidity correlations are measured using charged particles from sqrt(s_NN)=2.76 TeV Pb+Pb collisions by the ATLAS experiment at the LHC. The correlation function CN(η1, η2) is measured for different centrality intervals for | η1, η2|<2.4 and transverse momentum pT>0.5 GeV. An enhancement is observed along η- =η1-η2 ≈0 and a suppression is observed at large η- values. The correlation function is expanded in Legendre polynomials, and root-mean-square values of the Legendre coefficients at the single particle level an are measured. Significant values are observed for an, which decrease quickly for larger n. The leading coefficient a1 is compared to that estimated from a fit to CN(η+) for different η- slices, as well as to the asymmetry of the number of participating nucleons between the two colliding nuclei ANpart = (NpartF-NpartB)/ (NpartF+NpartB). The centrality dependence of a1 show a very similar shape as ANpart in mid-central collisions (20-50%), but show faster increase in more central and more peripheral collisions. The latter behavior suggests additional forward-backward multiplicity fluctuations that may arise from fluctuations at the sub-nucleonic level. The status of a similar measurement in proton-lead collisions will be reported. The implications of these measurements for constraining the early time dynamics of high-energy nuclear collisions are discussed.

On behalf of collaboration:

ATLAS

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